

A decorative border of various vegetables and stars surrounds the central text. The vegetables include yellow onions, red bell peppers, green leafy vegetables, broccoli, and green onions. The stars are small and yellow.

# **Your Daily Meal Assistant – What to eat today?**

AC215 – Team Dashers

# Background

## 01. Problem Statement

- Can't decide what to eat?
- Limited time to cook?
- Tired of spoiled food in your fridge?

You need a personal meal planning assistant!  
Take a picture of your ingredients, you will get a **streamline meal planning** with:



Recommended recipe with estimated cooking time and calories



Route suggestions for dining out

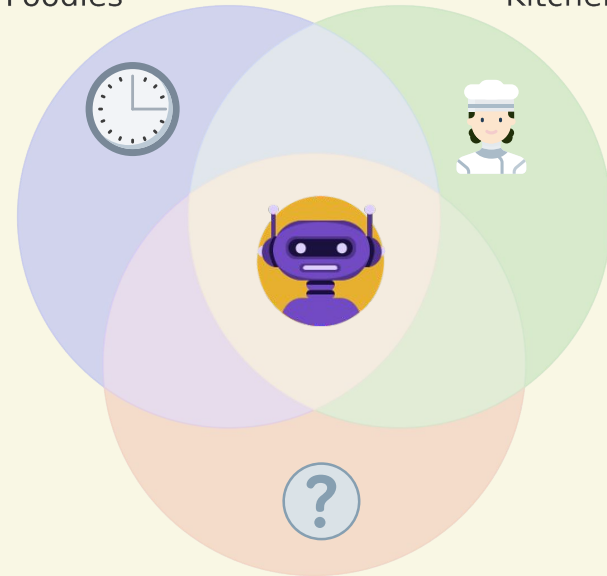


Food expiry tracker

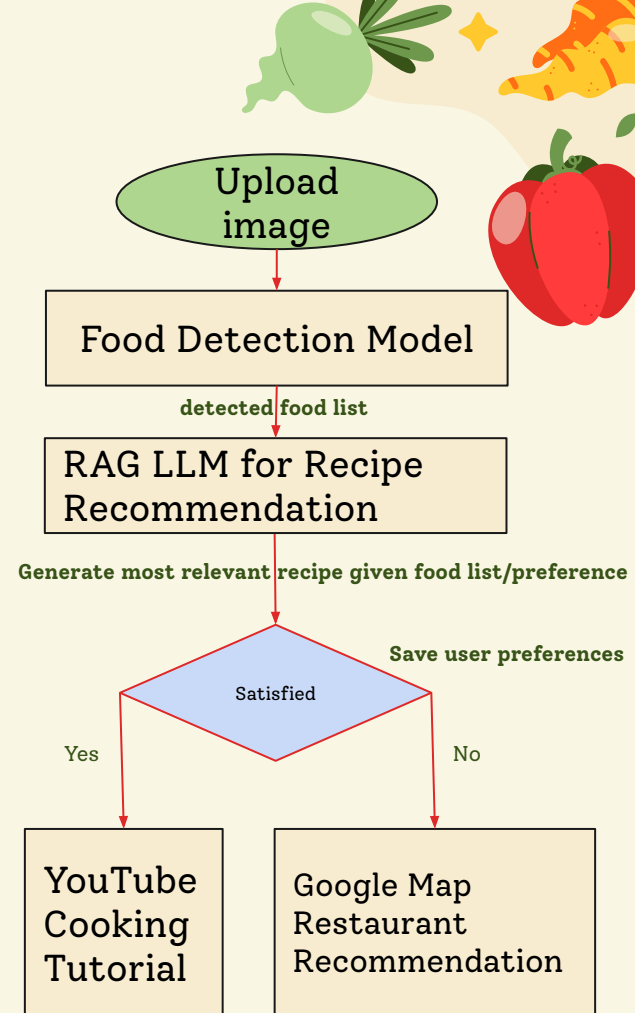
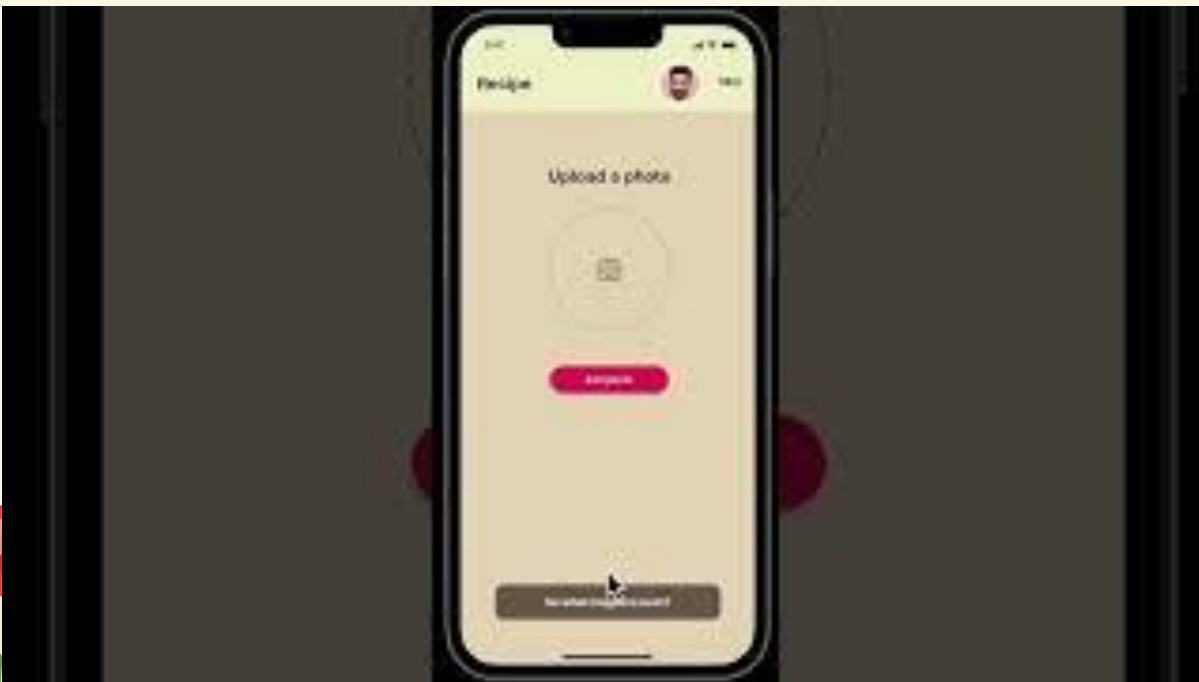
## 02. Target Audience

Time-Saver Foodies

Kitchen Newbies



Indecisive Eaters




# Unique Value Proposition

<b>Smart Integration of AI Technologies</b>	 <b>Competitors</b>	 <b>Our Benefits</b>
<p><b>Object Detection:</b> update inventory effortlessly</p> <p><b>LLM:</b> personalized recipe recommendation</p> <p><b>API calling agent:</b> Dine-out: Google map Cook: YouTube</p>	<p><b>Fail to offer end-to-end solution:</b></p> <ul style="list-style-type: none"><li>- No ingredient expiry tracker</li><li>- No "cook-or-dine" comparison</li><li>- No personalized food profile</li><li>- No ingredient-driven recipe recommendation</li></ul>	<p><b>Efficiency:</b></p> <ul style="list-style-type: none"><li>- Automate ingredient tracking</li><li>- Cost, Time, Health</li></ul> <p><b>Guidance:</b></p> <ul style="list-style-type: none"><li>- Video cooking tutorials</li><li>- Map navigation to restaurants</li></ul> <p><b>Engaging:</b></p> <ul style="list-style-type: none"><li>- Decision-Making Aid</li><li>- Weekly Summary Visuals</li></ul>



# Scalability and Efficiency

- **Model Selection and Performance Optimization**
    - Core Features Implemented
      - **Food Detection + Recipe Generation**
    - **Food Detection: GPT-4o-mini**
      - Contextual Understanding
        - educated guess on partially visible/ambiguous items
      - Textual Descriptions
        - generate descriptive text
      - Flexibility and Accuracy
- 

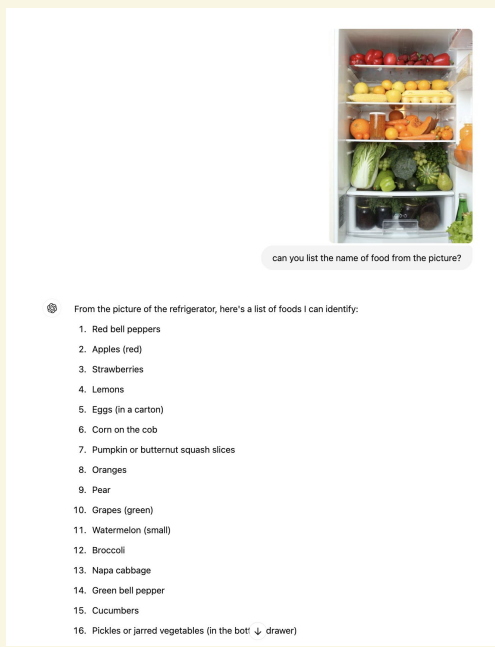
# Scalability and Efficiency

- **Model Selection and Performance Optimization**
  - Object Detection Model Selection

Input



GPT



EfficientDet-LiteO




YOLOV8s (Finetuned)





# Scalability and Efficiency

- **Recipe Generation: RAG with Finetuned Gemini 1.5 Flash**
    - **Fine Tuning Motivation**
      - Improve Contextual Understanding/Refine Recipe-Specific Embeddings
      - Prevent Hallucinations
    - **Training Data**
      - Raw Data: Recipes data with ***titles***, ***ingredients***, and ***preparation directions***
      - Training Data: **5000 question-answer pairs**
        - Q: "How do you prepare [recipe title] using these ingredients: [ingredients]?"
        - A: corresponding recipe directions.
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# Scalability and Efficiency

- **Recipe Generation: RAG with Finetuned Gemini 1.5 Flash**

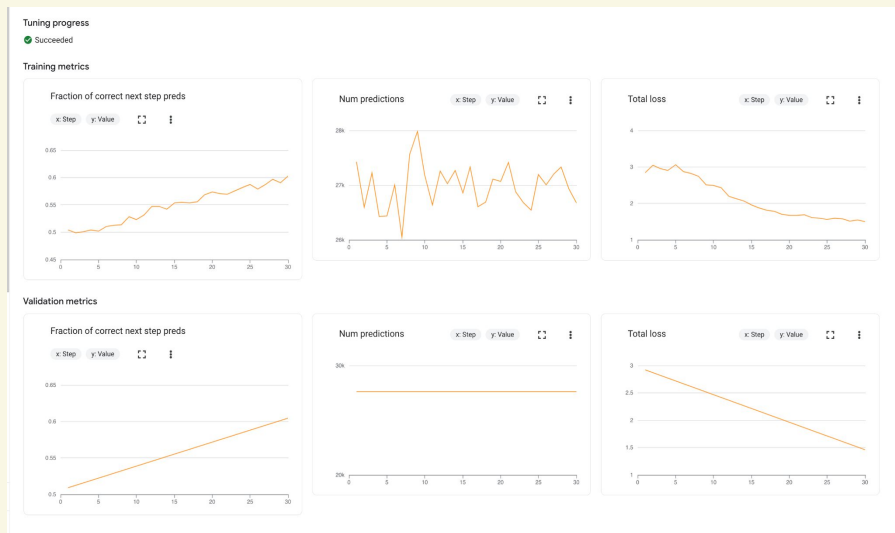
- Fine Tuning Process

- Base Model: gemini-1.5-flash-002

- Hyperparameters

- v1: epochs=3, adapter\_size=4, learning\_rate\_multiplier=1.0

- v2: epochs=4, adapter\_size=4, learning\_rate\_multiplier=0.9







# Scalability and Efficiency

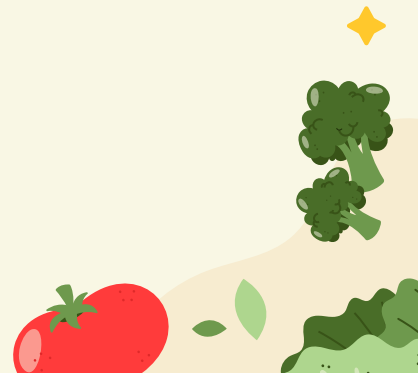
- **RAG**

- Recipe vector database (example in the table)

Title	Ingredients	Unquantified ingredients (Key)	Directions (Value)	Style
Jewell Ball's Chicken	["1 small jar chipped beef, cut up", "4 boned ..."]	["beef", "chicken breasts", "cream of mushroom..."]	["Place chipped beef on bottom of baking dish...."]	Casserole

- **Self-RAG**

- Auto-determine when to use vector embedding searching
  - Filter out irrelevant information when embedding queries
  - Extract an unquantified food list and styles (Query):  
ex. [dough, pizza source,...]



- 
- CLI example response

```
Enter your ingredients (or press Enter to use the default [broccoli, chicken, cheese]): [beef, corn]
```


LLM Response:

Based on the recipes you provided, we can make a **Corn Beef Casserole**.

Here's what we'll need:

```
* Beef (from your ingredients)
* Corn (from your ingredients)
* 1 (16 1/2 oz.) can whole kernel corn, drained
* 1 (16 1/2 oz.) can cream-style corn
* 1 (8 oz.) sour cream
* 1 (8 1/2 oz.) pkg. Jiffy corn bread mix
* 1 stick margarine
```

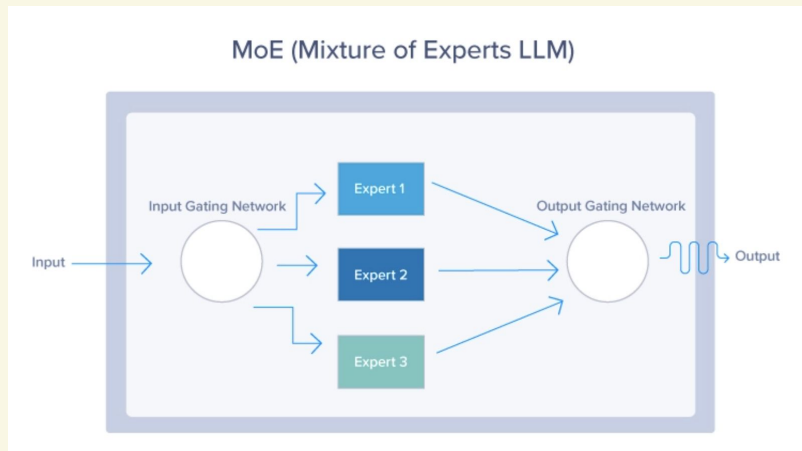
**Instructions:**

- Brown the beef** in a skillet.
  - In a bowl, mix the beef, corns, sour cream, corn bread mix, and melted margarine.**
  - Pour into a greased 8 x 8 x 2-inch pan.**
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# Scalability and Efficiency

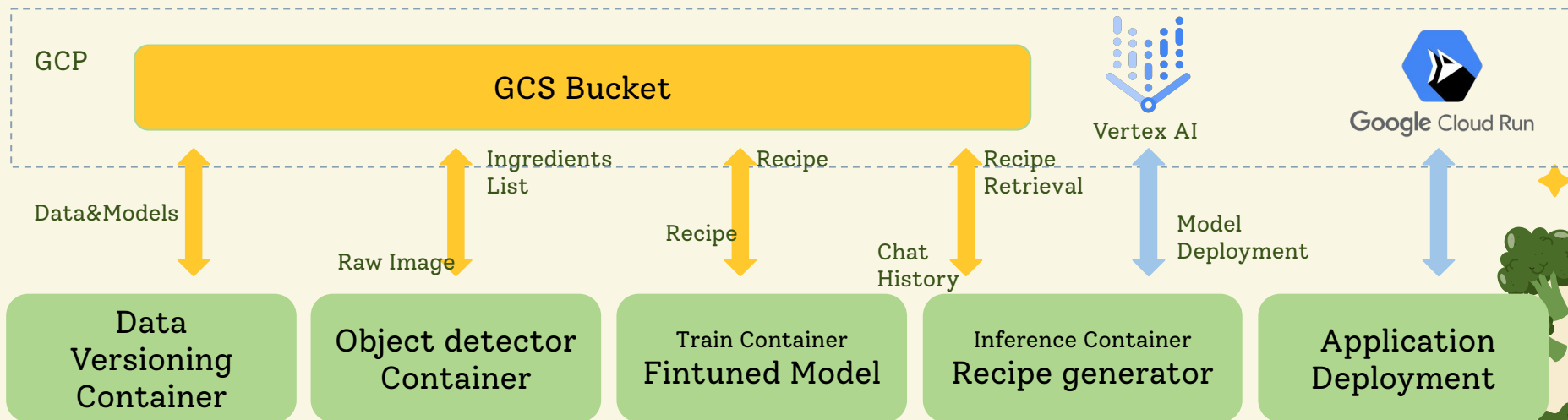
## Technical Scalability

- Gemini 1.5
  - Mixture-of-Experts (MoE) Architecture
    - Divides into **smaller/ specialized networks**
    - Activate a subset of experts for each input
- Serverless Computing: Google Cloud Run
  - Supports up to 80 concurrent requests (configurable to 1000 max)
  - Scalability tested with Google Kubernetes Engine



## Infrastructure Considerations

- GCP
  - **Scalable** cloud infrastructure; ideal for **large data & model demands**.
- Vertex AI
  - **Streamlined** model training/deployment/ monitoring
- Docker
  - **Consistent** environments across development/ production
- DVC
  - Facilitates **version control** for datasets/ model files





# Future Development

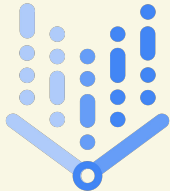
1. Build Vertex AI pipeline

Automate the workflow

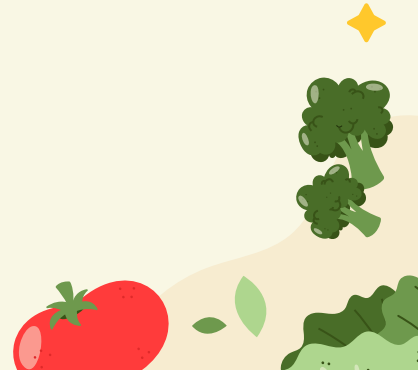
2. UI integration with WhatsApp

Easy to start for users

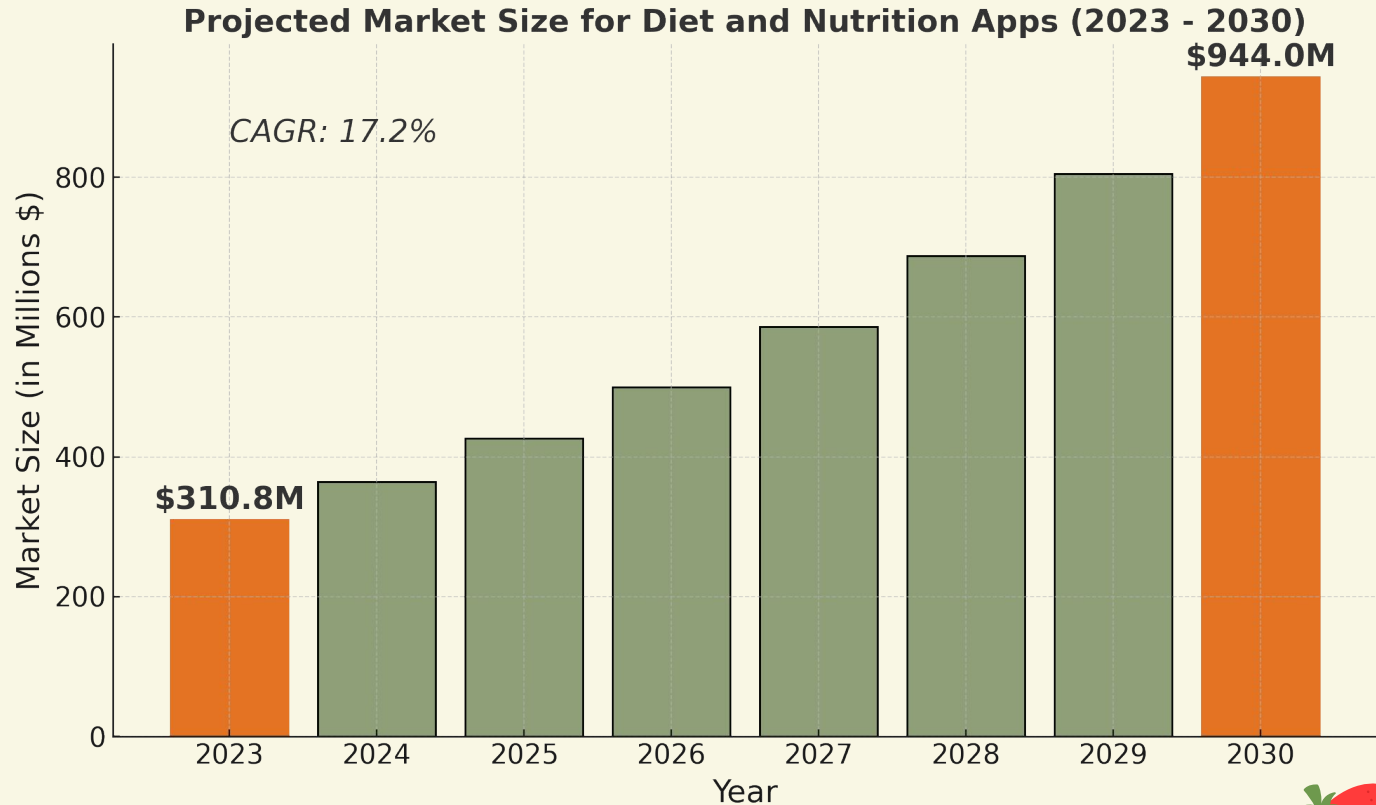
Bigger Picture?



Vertex AI



# Market Growth





# Market Growth

## Key drivers

Health Consciousness

Lifestyle influenced chronic disorders:

**422 million** individuals have diabetes globally in 2023

Prevalence of Obesity

World Obesity Federation: **1 billion** people have been estimated to be living with obesity by 2030 globally



# Future Development

## Data Tracking for Health and Diet Outcomes

1. Allow user to set dietary goals related to weight management, diabetes control...
2. Collect user feedback for continuous improvements

**Daily Meal Assistant**

## Develop Health-Focused Recipe Recommendations

1. Create Recipe Categories Targeting Chronic Conditions
2. Add Filters for Dietary and Health Goals

high-fiber

nutrient-dense

low-sugar

Partnership  
with Food and  
Health Brands



**Thank you!**



**Let's Q&A...**